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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,785	08/17/2006	Chi Matsumura	2006_1377A	9654

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EXAMINER	
BELL, BRUCE F	
ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/589,785	MATSUMURA ET AL.	
	Examiner	Art Unit	
	Bruce F. Bell	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 August 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/17/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 13, 14, 16-22, 24-33, 37-39 are rejected under 35 U.S.C. 102(e) as being anticipated by Fujimura et al (2004/0124095)

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Fujimura et al discloses a high purity hydrogen being recovered from a pyrolysis gas, composed of hydrogen and carbon monoxide, produced by pyrolysis of an organic material such as biomass. A method for producing the high purity hydrogen includes supplying a reducing gas produced by pyrolysis of an organic material to an anode side of a high temperature steam electrolyzer having a diaphragm comprising solid oxide electrolyte and supplying steam to a cathode side of the high temperature steam electrolyzer to produce hydrogen and oxygen by electrolytic action. The oxygen produced in the cathode side of the high temperature electrolyzer passes through the diaphragm and reacts with the reducing gas to create concentration gradient of oxygen ion to lower the electrolysis voltage. See abstract. The reducing gas is mainly composed of hydrogen and carbon monoxide and the electrolysis voltage is lowered by supplying a reducing gas to an anode side of a high temperature steam electrolyzer and allowing the reducing gas to react with oxygen ions at the anode side of the high temperature electrolyzer. See paragraphs 0009-0010. The pyrolysis furnace has dual fluidized beds, wherein one is a pyrolysis fluidized bed and a combustion fluidized bed, heating medium is circulated between the two beds and a reducing gas is supplied to the electrolyzer while preventing the pyrolysis gas from being mixed with the combustion gas. See paragraph 0022. The pyrolysis fluidized bed employs steam as a fluidizing gas, a combustion fluidized bed which employs air as a fluidizing gas and a heating medium moving bed for allowing a heating medium to move between the pyrolysis fluidized bed and the combustion fluidized bed. Waste heat of combustion exhaust gas discharged from the combustion fluidized bed may be utilized in a separate

device. The fluidized gas in the pyrolysis fluidized bed, as a part of the pyrolysis gas, maybe be circulated and used, in place of steam. The produced pyrolysis gas is distributed through a flow control valve in a controlled distributed amount. The gas flowing from the flow control valve and line is supplied to an anode side of the electrolyzer and the gas flowing through another line is stored in a gas reservoir and is utilized in a gas engine. See paragraph 0028. The electrolyzer is partitioned into an anode side and a cathode side by a diaphragm of solid oxide electrolyte. An alternating electric power source is converted into DC by an AC-DC converter and is supplied to the electrolyzer, wherein high temperature steam being supplied to the cathode side is electrolyzed into hydrogen and oxygen. The high temperature exhaust gas generated in the anode side passes through a heat exchanger and is discharged to the outside of the system as low temperature exhaust gas. Steam produced in the heat exchanger can be utilized as the fluidizing gas of the pyrolysis fluidized bed and high temperature steam is distributed through a flow control valve to a line in a controlled distributed amount. See paragraph 0029. Pyrolysis gas and high temperature steam supplied to the electrolyzer can be automatically controlled in an amount by the flow control valves and so that the operation temperature of the electrolyzer can be maintained and operated under optimum condition, so as to meet input electric energy and quantity of generated hydrogen.

The prior art of Fujimura et al anticipates the applicants instant invention as shown by way of the disclosure above. The recitation in the system claims with respect to the temperature range of the apparatus has been given little or no patentable weight,

since an apparatus or system is to be claimed in terms of features rather than process steps. Since the prior art of Fujimura et al has all the features as instantly recited, including the heat exchanger, which only has to be capable of performing such function, it appears that the instant claims as recited have been inherently met, especially in view of the fact that a heat exchanger can be a means of heating and/or cooling and is dependent upon how the system is set to perform the function of maintaining the temperature within that particular system. Therefore, the prior art of Fujimura et al anticipates the applicants instant claims as presented.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Peter et al (2007/0138022) in combination with Fujimura et al (2004/0124095).

Peter et al disclose a system and method for the production of hydrogen. A high temperature heat source with a solid oxide electrolyzer cell and heat exchanger is used, wherein the heat exchanger is used to extract heat from molecular components such as hydrogen derived from electrolysis. A portion of hydrogen generated in the solid oxide electrolyzer is recombined with steam and recycled to the solid oxide electrolyzer. The oxygen generated on the anode side is swept with compressed air and used to drive a gas turbine that is in communication with a generator. Electricity generated by the

generator is used to drive the electrolysis in the electrolyzer. See abstract. The hydrogen producing system has a cathode side loop and an anode side loop wherein the cathode side loop includes a boiler, high temperature heat source, an electrolyzer cell, heat exchanger, feed water heater and a condenser. The anode side loop comprises the heat exchanger, a turbine, a compressor and an electrical generator. See paragraphs 0022-0023. The cathode side loop has a boiler that is in communication with the cathode side of the electrolyzer and the boiler generates steam and superheats the steam using thermal energy from the high temperature heat source. The boiler supplies the superheated steam to the cathode side of the electrolyzer for efficient electrolysis into hydrogen and oxygen. The electrolysis of stem used less electrical energy input than the electrolysis of water. See paragraph 0024. The electrolyzer electrolyzes a portion of the steam, wherein a portion of the exhaust from the cathode side is recycled to the inlet of the cathode. A heat exchanger, a feed water heater and a condenser lie downstream of the electrolyzer and are in communication with the electrolyzer and with each other, The feed water heater and the condenser lie downstream of the heat exchanger. And the condenser lies downstream of the water heater. See paragraph 0025. High temperature hydrogen generated at the electrolyzer along with residual unconverted steam from the electrolyzer flows through the heat exchanger where some of its heat energy is extracted to heat air that serves as the input to the anode side of the electrolyzer. See paragraph 0026. The water heater lies downstream of the electrolyzer and upstream of the condenser. The water heater and condenser can be made to lie in a recycling loop. When the water heater and

condenser lie in a recycling loop, condensate obtained from the condenser due to the condensation of steam is recycled to the water heater, along with make up water. The water is preheated in the water heater by absorbing waste heat from the residual steam as well as the hydrogen generated at the electrolyzer. After being preheated in the water heater, the water is directed to the boiler where it is converted to superheated steam. See paragraph 0027. The anode side of the hydrogen producing system comprises a turbine for sweeping oxygen generated in the electrolyzer. The turbine is located downstream of the electrolyzer and is in mechanical communication with a compressor. The turbine drives the compressor. The compressor is located upstream of the electrolyzer and is used to pump compressed air into the anode side of the solid oxide electrolyzer. The compressed air from the compressor along with the oxygen generated in the electrolyzer is used to drive the turbine, which transmits torque via a shaft to drive the compressor. See paragraph 0029. The exhaust steam along with they hydrogen generated in the electrolyzer are then cooled in the heat exchanger that is located downstream from the electrolyzer. The heat exchanger is a gas to gas heat exchanger. The heat exchange transfers heat extracted from the steam and the hydrogen to the air used on the anode side of the electrolyzer. See paragraph 0043. The hydrogen and steam from the heat exchanger is transferred to the water heat , where waste heat from the hydrogen and steam is used to preheat water that is converted to steam by the boiler. The outlet temperature of the hydrogen and steam from the water heater is about 300 to 450^0 C The outlet temperature for the hydrogen and stem emanating from the water heater is about 325 to 375^0 C. See paragraph 0044.

The patent further discloses that one would recognize that the oxygen rich air exiting a turbine is at a relatively high temperature and my have some value for its thermal energy. The oxygen enriched air exiting the turbine is at a temperature of about 200 to 500^0 C. One potential method to utilize this thermal energy is to pass the exhaust through a heat recovery steam generator (HRSG). The HRSG can comprise a shell and tube heat exchanger, wherein pressurized water is pumped through the tubes and is heated by the turbine exhaust. The water boils to steam and the steam can be further heated by the turbine to super heat steam. This steam is expanded through a steam turbine connected to an electrical generator to generate electricity, This steam is expanded through a steam turbine mechanically connected to the feed water pump on the cathode side and drives the fee water pump. See paragraph 0052.

The prior art of Peter et al does not teach the use of a reducing gas to be introduced to the anode of the electrolyzer.

The prior art of Fujimura et al is as disclosed above in the 35 USC 102(e) rejection above.

The subject matter as a whole would have been obvious to one of ordinary skill in the art at the time the instant invention was made because even though the prior art of Peter et al does not disclose that a reducing gas be used and introduced to the anode of the solid oxide electrolyzer, the prior art of Fujimura et al sets forth that the use of a reducing gas being introduced to the anode of such a hydrogen production cell is known and that such reducing gas is used for its ability to create a concentration gradient of oxygen ion, and to lower the electrolysis voltage. Therefore, to utilize such a

concept in the invention of Peter et al would be within the ability of the person having ordinary skill in the art. Applicants will argue that the date depended on for this rejection is not any good, however, applicants in order to overcome such rejection, are required to provide a certified English translation of the foreign priority documents. Therefore, the rejection above is proper until such time as those translations are received and checked with respect to the subject matter instantly claimed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bruce F. Bell whose telephone number is 571-272-1296. The examiner can normally be reached on Monday-Friday 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BFB
December 31, 2008

/Bruce F. Bell/
Primary Examiner, Art Unit 1795